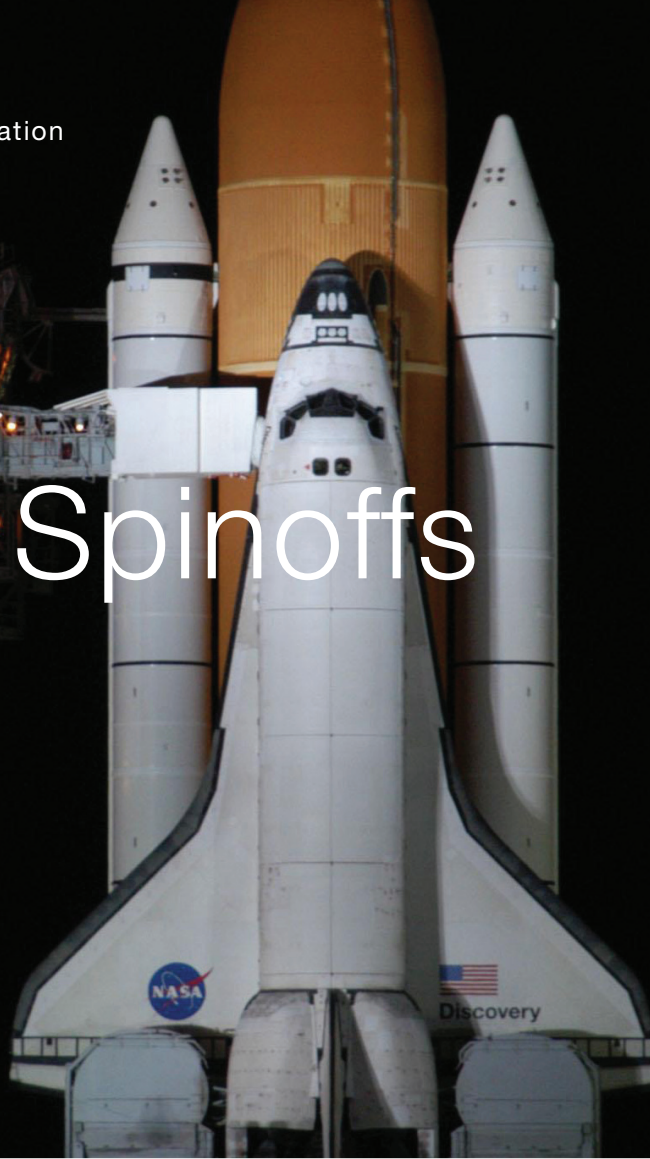
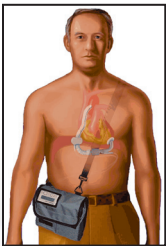




# Space Shuttle Spinoffs



Space technology benefits you every day in a variety of ways. Since 1976, over 1,600 documented NASA technologies have benefitted U.S. industry, improved our quality of life, and created jobs. The Space Shuttle Program alone has generated more than 100 technology spinoffs. Some of the shuttle's contributions are:



## Artificial Heart:

More than 200 patients received a second chance at life with tiny heart pumps developed from space shuttle fuel pump technology. Just 1 inch in diameter and weighing less than 4 ounces, the miniaturized ventricular assist pumps were developed by NASA and renowned heart surgeon Dr. Michael DeBakey.



## Green Lubricants:

Sporting equipment and cars are kinder to the environment with NASA's high-performance, biodegradable lubricants developed for the enormous crawlers that move the space shuttles to and from the launch pads in Florida.



## Rescue Tool:

Rescue squads use a new handheld cutter to remove accident victims from wrecked vehicles. Based on a miniature version of the explosive charges used to separate the shuttle from the solid rocket boosters after launch, this device requires no auxiliary power or cumbersome hoses, and it costs 70% less than previous rescue equipment.



## Firefighting Infrared Camera:

Firefighters locate hot spots in wildfires by scanning the flames with this sensitive infrared handheld camera, first used by NASA to observe the blazing plumes from shuttles.





### **Automotive Insulation:**

NASCAR racecars shield drivers from extreme engine heat using materials from the same thermal protection system used to safeguard NASA astronauts onboard the space shuttle. Their lives depend on it.



### **Life-saving Light:**

Children suffering from brain tumors may receive relief from lighting technology originally developed for space shuttle plant experiments. Doctors at the Medical College of Wisconsin in Milwaukee are studying the ability of these light-emitting diodes to kill cancerous tumors in a process called photodynamic therapy.



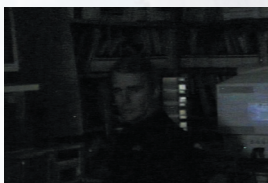
### **Land Mine Removal Device:**

The same rocket fuel used to propel the space shuttle skyward helps save lives on Earth by destroying land mines. Created from leftover fuel donated by NASA, an explosive flare is placed next to the uncovered land mine, then ignited from a safe distance using a battery-triggered electric match. The explosive burns away, disabling the mine and rendering it harmless.



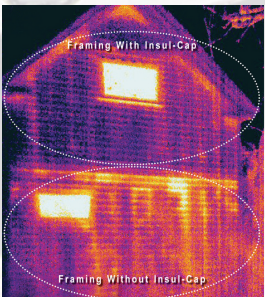
### **Prosthesis Material:**

Foam insulation used to protect the shuttle's external tank is now available to produce master molds for prosthetics. Replacing heavy, fragile plaster, this new material is light, virtually indestructible, and easy to ship and store.



### **Video Stabilization Software:**

When law enforcement officials needed help clarifying crime-scene video, NASA assisted with high-tech image processing technology used to analyze space shuttle launch video. This software removes defects due to image jitter, rotation, and zoom in video sequences, and may also be useful for medical imaging, scientific applications, and home video.



### **Home Insulation:**

Homeowners are insulating their homes with the same lightweight, flexible aerogel NASA uses to insulate cryogenics on space shuttles. The insulation is many times thinner and more effective than standard fiberglass insulation, yet can be handled and installed with the same traditional methods.